

RUC change implementation - planned for 3/31/2009- 12z NCEP operations

- Use of NESDIS snow data to trim RUC snow areal coverage
- Ensure retention of clouds/ceiling in short-range RUC forecasts. Avoid “hole-punching” from METAR clear observations through higher cloud layers (above 12 kft AGL) shown in GOES
- Correct run-total accumulated precipitation

RUC snow cover fix

- use of NESDIS snow data to trim RUC snow areal coverage

Background:

- Complaints from NWS Eastern (Burlington), NWS Central (Cleveland), other offices from too extensive RUC snow cover and too cold 2m temperatures in conditions of warm air advection over partial snow cover over past few years, especially in spring.
- Complaint from Weather Channel (Joe Koval) on RUC snow cover not melting quickly enough in fall 2008.
- RUC uses cycled snow cover, snow water equivalent (SWE), snow temperature in 1h cycle, melting forced by RUC LSM and, in part, by hourly assimilation of sfc obs. Effective RUC snow evolution overall, especially for diurnal effects and under cloudy conditions (advantage over NESDIS snow), but vulnerable sometimes in areal coverage.

RUC snow cover fix

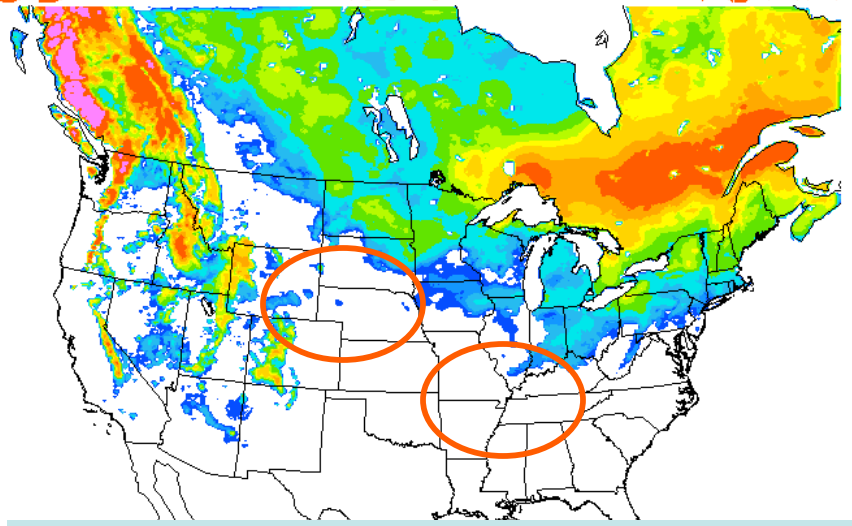
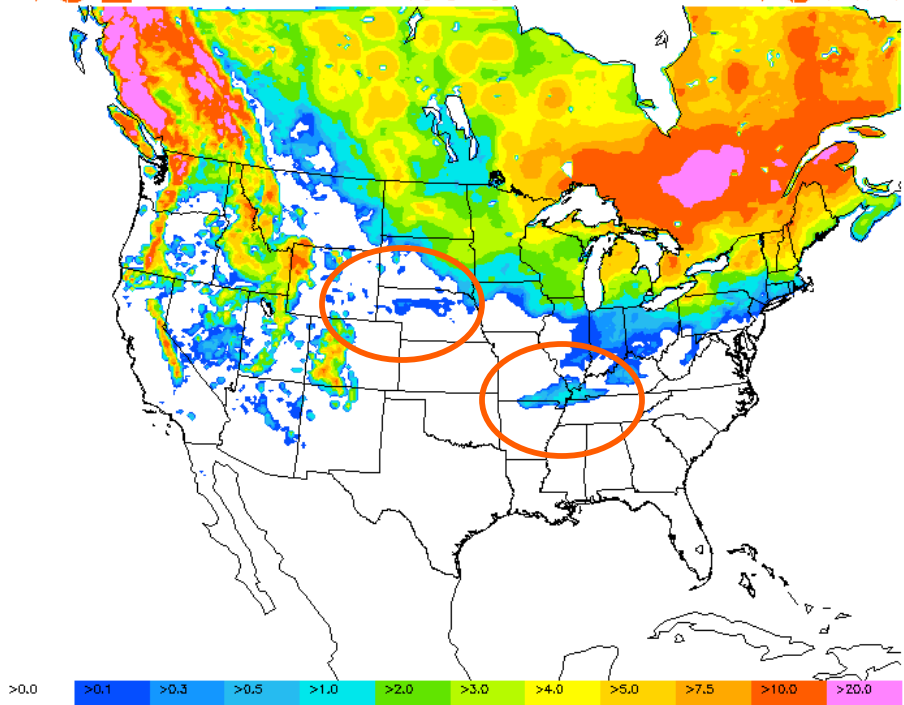
- use of NESDIS snow data to trim RUC snow areal coverage

Code fix:

- Use NESDIS snow cover in RUC model preprocessor (hybcst_pre) to trim cycled RUC snow fields under following conditions:
 - Applied once daily in RUC cycle when new NESDIS snow/ice analysis becomes available (usually 19z)
 - Apply at horizontal grid points with RUC snow cover where NESDIS shows no snow cover
 - if RUC 1h forecast surface temp > 274K (above freezing), and
 - if there is no snow, rain, or graupel in previous RUC 1h forecast
 - If these conditions are not met, no change made -- possible ambiguity from clouds, current snow event, or finer RUC elevation.
 - Routines changed: inithybv_pre.f, snohires.f. NESDIS snow/ice data already used in RUC hybcst_pre for ice cover information.

NCEP Operational RUC13 NOAA

GSD Development RUC13 NOAA



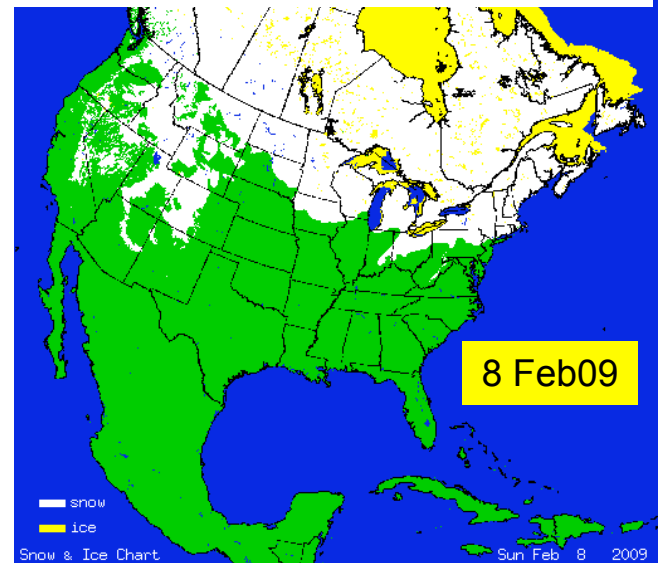
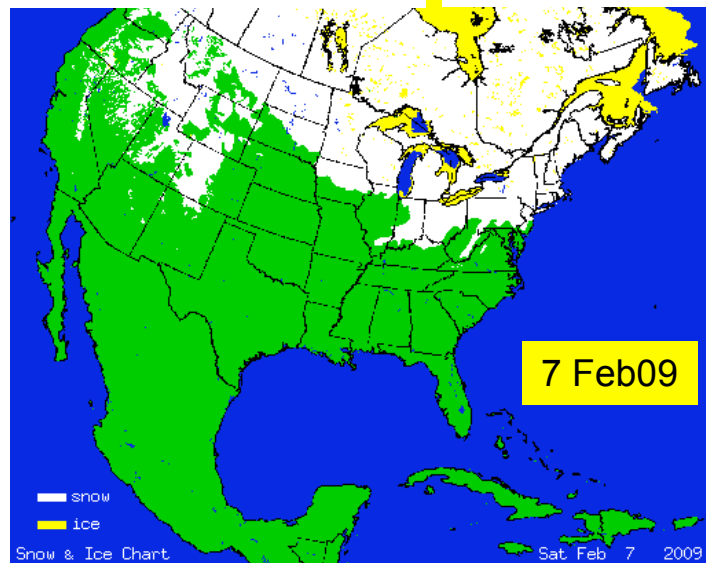
Dev13RUC w/ code fix made 7 Feb, application so far on 7 Feb and 8 Feb

Snow Water Depth (inches)
3-hr fcst valid 08-Feb-09 22:00Z

Snow Water Depth (inches)
3-hr fcst valid 08-Feb-09 22:00Z

NESDIS snow cover

http://www.natice.noaa.gov/pub/ims_gif/DATA/cursor_usa.gif



NCEP

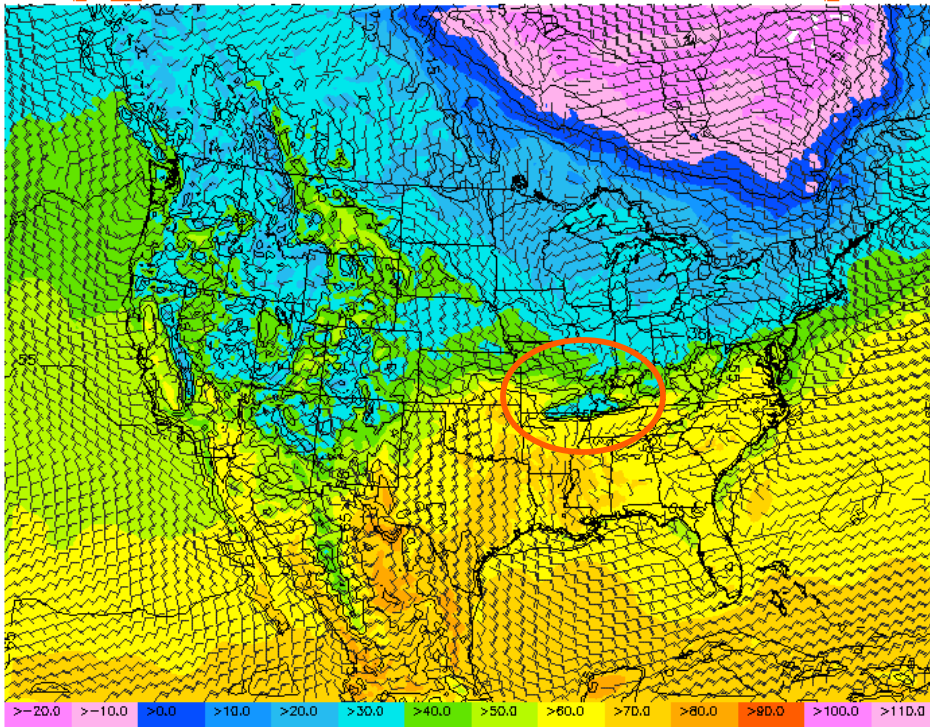
Operational
RUC13

NOAA

GSD

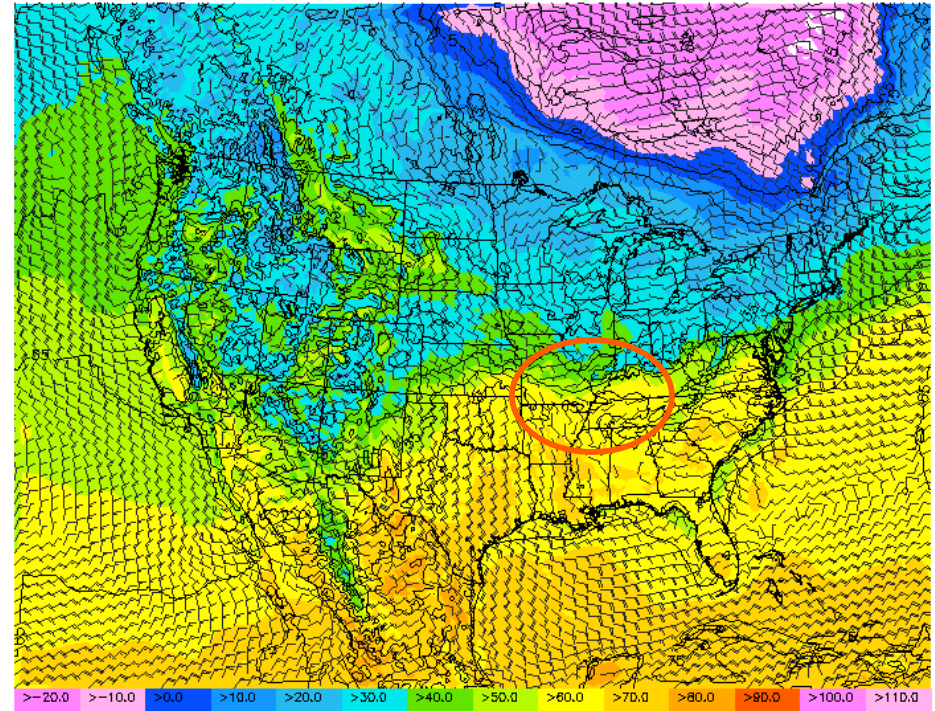
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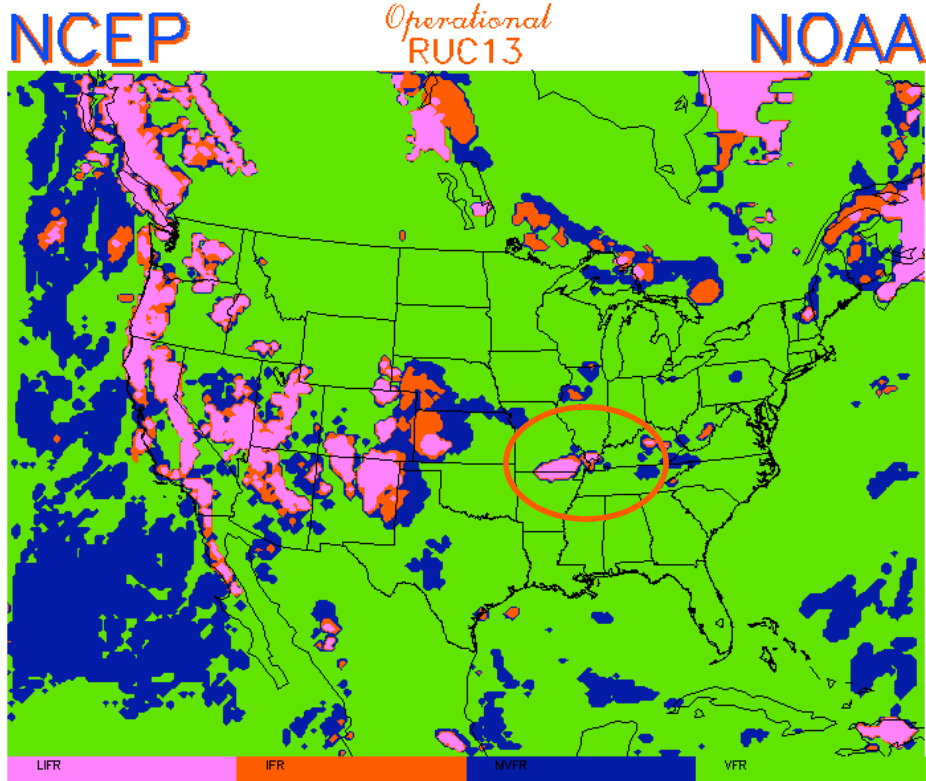
Surface Temperature / Winds ($^{\circ}\text{F}$ / Knots)
3-hr fcst valid 08-Feb-09 22:00Z

Errors in 2m temp due to erroneous snow cover in operational RUC



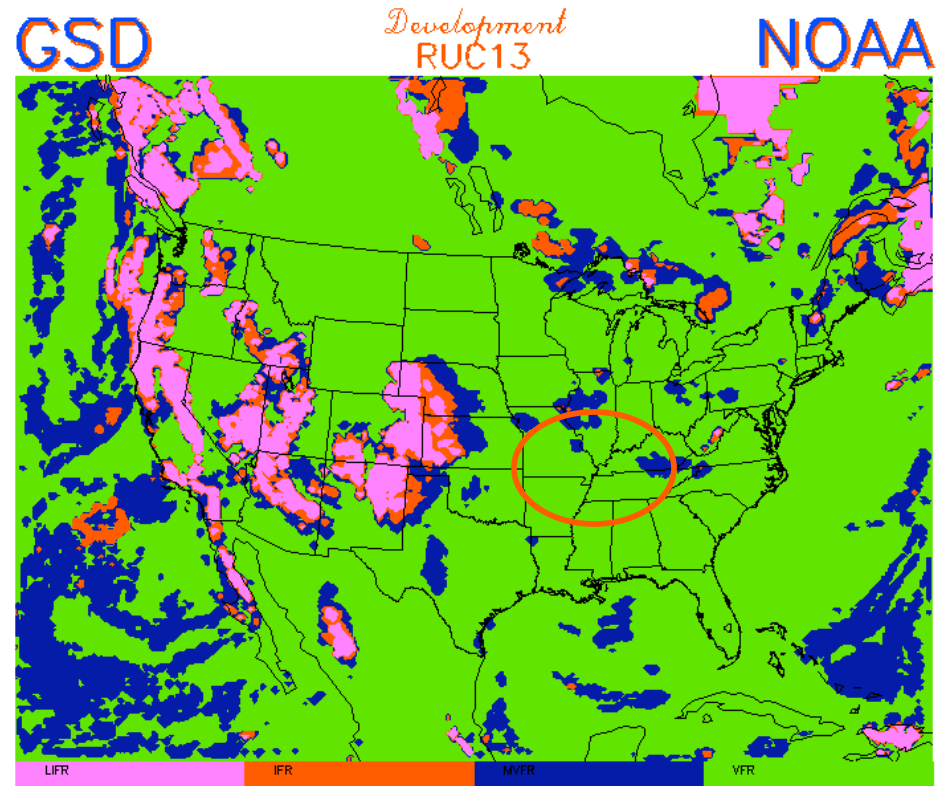
Surface Temperature / Winds ($^{\circ}\text{F}$ / Knots)
3-hr fcst valid 08-Feb-09 22:00Z

Improved 2m temp in dev13RUC with hybcst_pre correction for NESDIS areal trimming.



Aviation Flight Rules (Experimental – Not for operational use!)
 3-hr fcst valid 08-Feb-09 22:00Z

Another consequence from snow cover error:
 Low fog due to erroneous snow cover in operational RUC



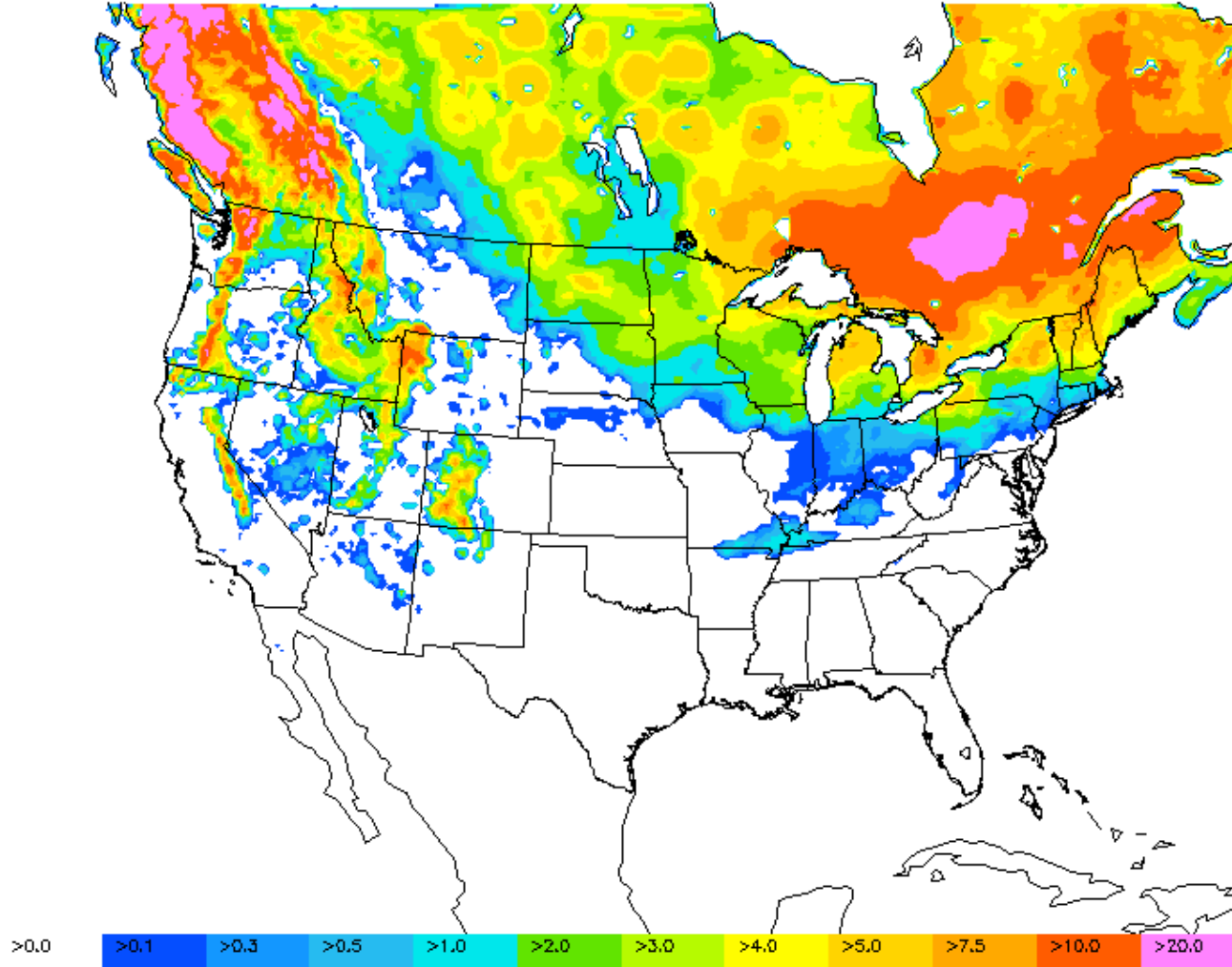
Aviation Flight Rules (Experimental – Not for operational use!)
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Improved cloud cover in dev13RUC with hybcst_pre correction for NESDIS areal trimming.

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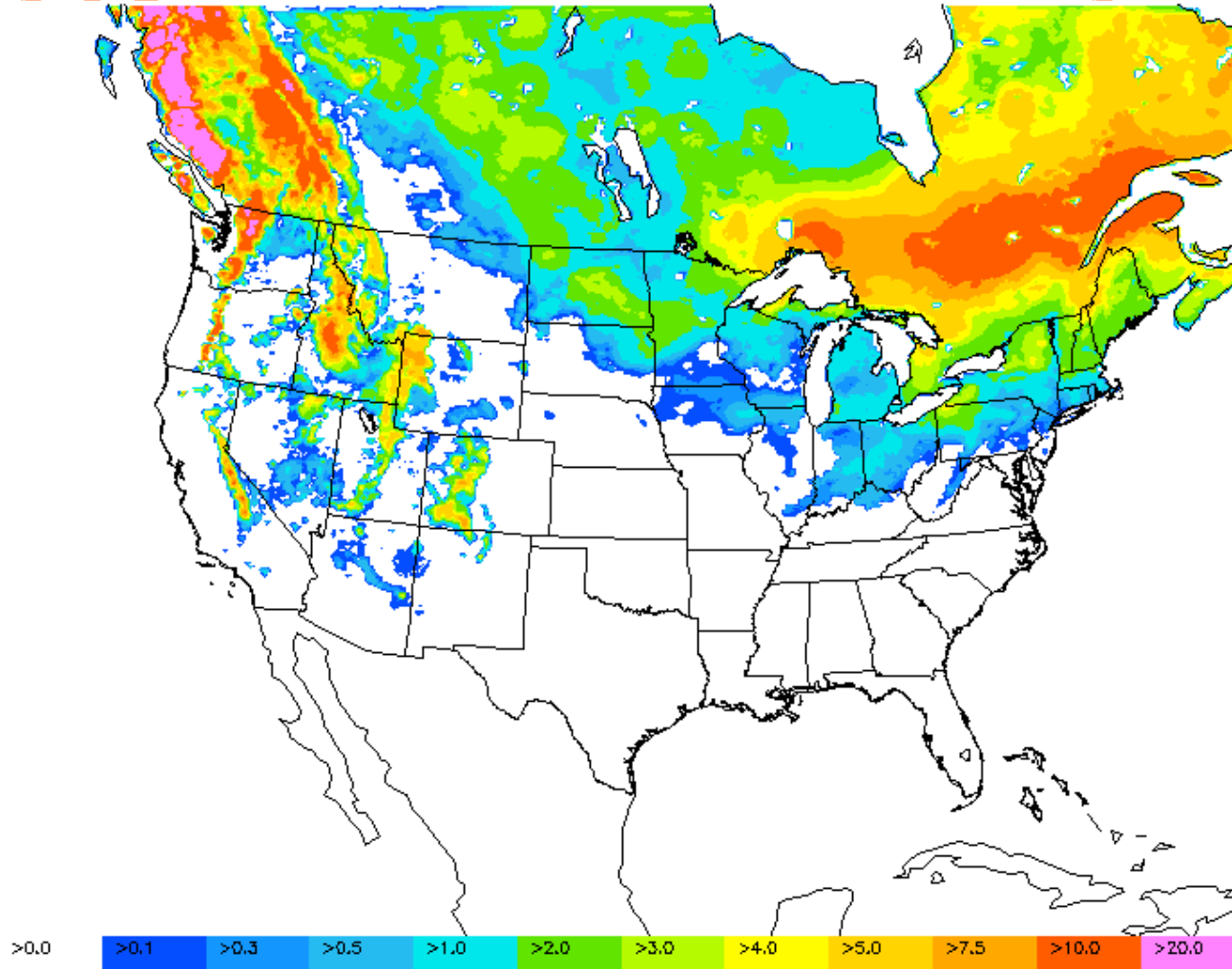


Snow Water Depth (inches)
3-hr fcast valid 08-Feb-09 22:00Z

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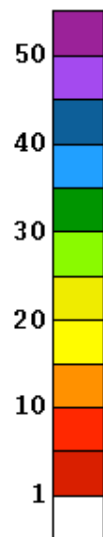
Snow Water Depth (inches)
3-hr fcast valid 08-Feb-09 22:00Z

RUC cloud analysis changes - part of 31 March 2008 change package

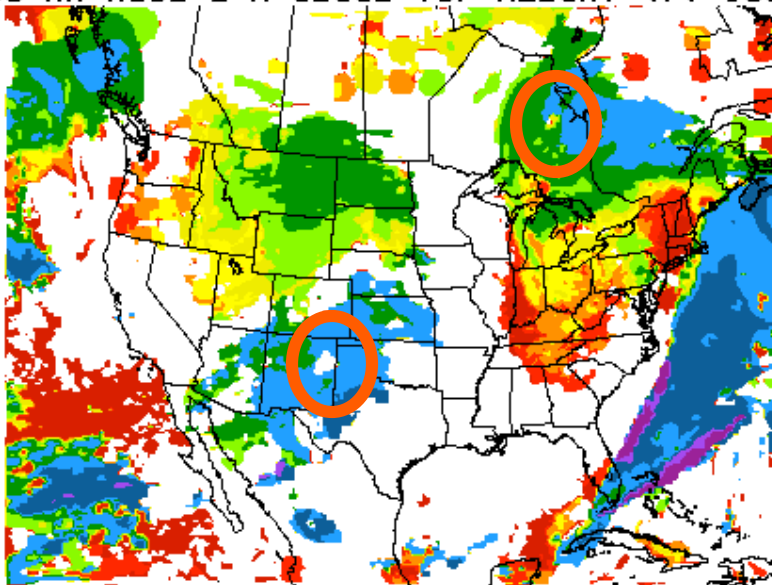
Fixes to subsaturation and “cloud hole” sources in RUC analysis

- Fix of hybcloud.f code producing “hole punches” in cloud cover, especially over Canada. (Ensure that METAR clear report does not result in cloud clearing above 12 kft (ceilometer range))
- Move call to cloud analysis (hybcloud.f) to end of RUC analysis (hybanl_qc.f), after all other analysis steps are taken (reduce introduction of subsaturation at cloudy 3-d points). Add loop to ensure water vapor saturation at all cloudy 3-d points at end of RUC analysis.
- Use of same saturation vapor pressure definition as in RUC model (hybcst)

Fix to cloud analysis to remove "hole punching" in RUC cloud analysis



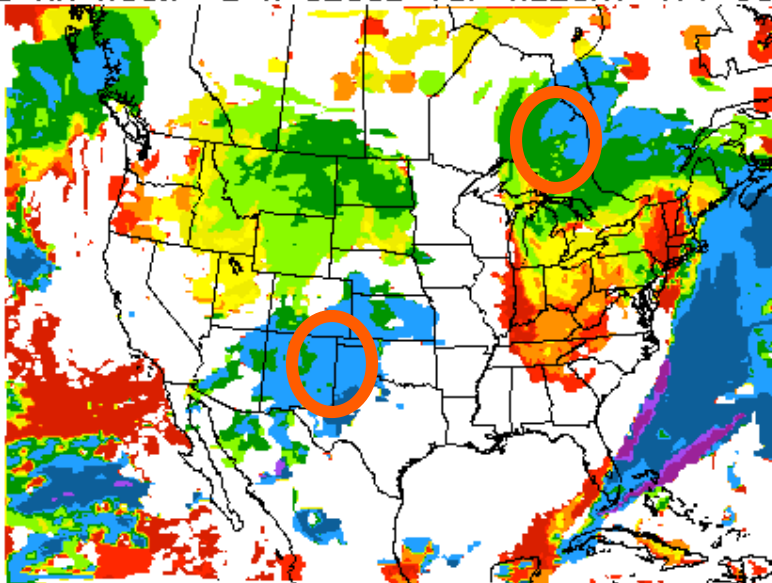
00-HR RUC2 2-M CLOUD TOP HEIGHT (ft*1000)



Oper RUC

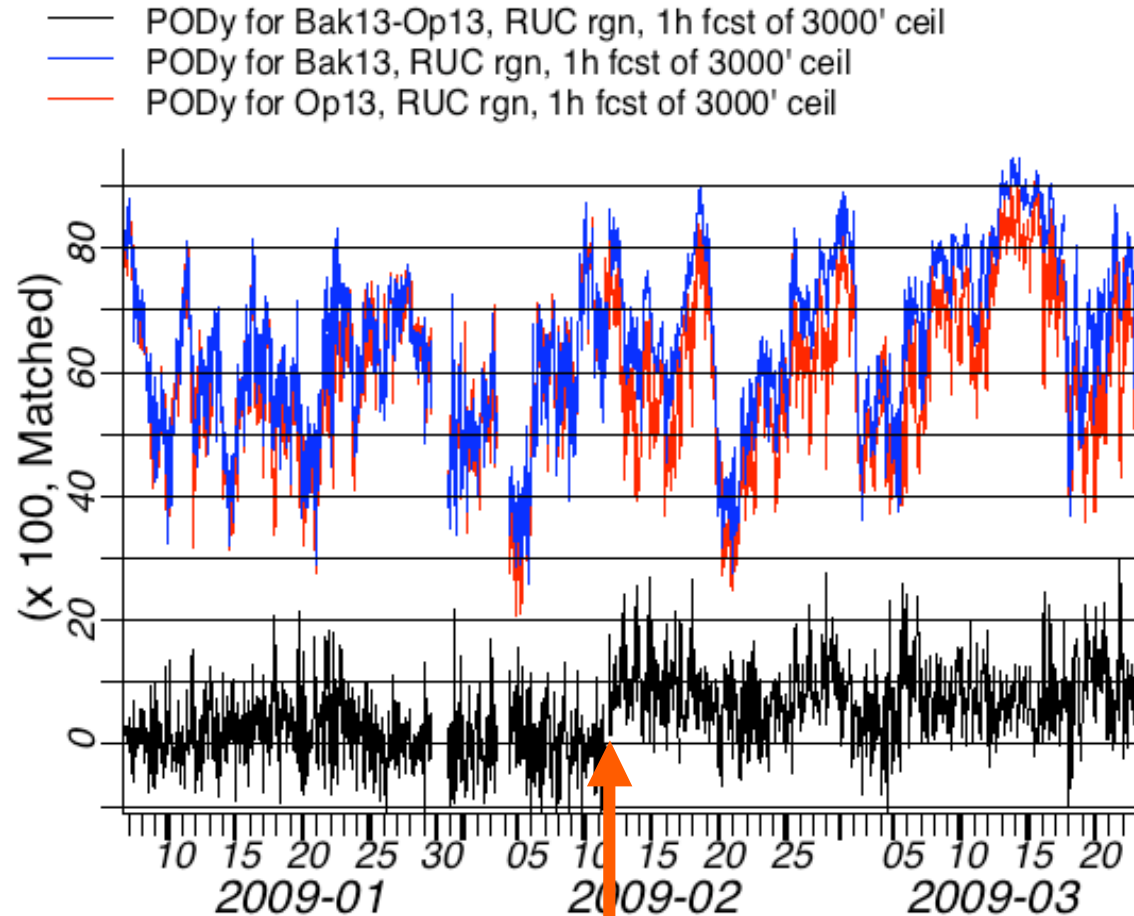
FCST MADE 22Z 03/29

00-HR RUCX 2-M CLOUD TOP HEIGHT (ft*1000)



Para RUC

Improved PODy for RUC 1h 3000-ft (MVFR) ceiling forecasts after change on 2/10/2009 to backup RUC run at ESRL/GSD



Change made 2/10/09

Conclusions

- Improved surface temperature, wind, dewpoint, cloud forecasts by snow cover fix to improve RUC snow areal coverage
- Improved short-range ceiling/cloud forecasts (and indirect effect on surface radiation balance) from cloud improvements.